

An SDO/AIA-Observed Filament Eruption Triggered by a Lid-Removal Onset Mechanism

Alphonse C. Sterling, Ronald L. Moore, David A. Falconer, & Javon M. Knox

Abstract: An eruption of a solar filament often presages the onset of a more general solar eruption, often leading to a solar flare and coronal mass ejection (CME). Among the mechanisms suggested for triggering eruptions are flux cancelation, flux emergence, tether-cutting reconnection, and breakout reconnection. Here we present an example of a filament eruption due to a different trigger mechanism, which we call "lid removal," whereby a magnetic structure overlying the filament is removed by a preceding adjacent eruption, rendering MHD unstable the magnetic system containing the filament and resulting in the subsequent eruption of the filament. This filament eruption occurred on 23 Jan 2013, and was well-seen in SDO/AIA 193 Ang images. Prior to its eruption the filament was at an approximately constant height above the solar surface for ~4 hours, before smoothly lifting off.

Evidence for the overlying "lid"

field was difficult to discern in 193 Ang images, but was apparent in hotter coronal images, such as SDO/AIA 335. Removal of the lid field was due to an eruption of that field visible in the hotter-corona images. In this way, the lid-removal filament-eruption mechanism is similar to recent observations of connected or cascading eruptions originating from magnetically-linked locations.

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